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ABSTRACT

The performance and career progression of a sample of 20,705 airmen were monitored throughout their initial tour of service. For comparative purposes, this sample was divided into high school graduate and nongraduate groups and further subdivided by Armed Forces Qualification Test (AFQT) mental categories. Points of comparison included: disposition from basic military and technical training, attainment of skill levels, number of disciplinary actions and unsuitability discharges, and reenlistment decision. On almost all measures, high school graduates constituted a significantly more successful military group than did the nongraduates, and among the nongraduates, in terms of mental category subgroups, there were almost no differences in performance. In addition, the effects of varying enlistment requirements on this sample are presented, and attention was directed toward determining which nongraduates might be better risks than others for military service. (Appended are a 17-item bibliography and tables of skill level comparisons). (Author)

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AIR FORCE

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LABORATORY

COMPARISON OF PERFORMANCE AND CAREER PROGRESSION OF HIGH SCHOOL GRADUATES AND NON-GRADUATES IN THE AIR FORCE

By

Jeffrey E. Kantor
Nancy Guinn

PERSONNEL RESEARCH DIVISION
Lackland Air Force Base, Texas 78236

December 1975
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The performance and career progression of a sample of 20,705 airmen were monitored throughout their initial tour of service. For comparative purposes, this sample was divided into high school graduate and non-graduate groups and further subdivided by Armed Forces Qualification Test (AFQT) mental categories. Points of comparison included: disposition from basic military and technical training, attainment of skill levels, number of disciplinary actions and unsuitability discharges, and reenlistment decision. On almost all measures, high school graduates constituted a significantly more successful military group than did the non-graduates, and among the non-graduates, in terms of mental category subgroups, there were almost no differences in performance. In addition, the effects of varying enlistment requirements on this sample are presented, and attention was directed toward determining which non-graduates might be better risks than others for military service.

PREFACE

This research was conducted under Project 7719, Air Force Personnel System Development on Selection, Assignment, Evaluation, Quality Control, Retention, Promotion, and Utilization; Task 771902, Exploration of Methods for Increasing the Effectiveness of Personnel Programs.

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COMPARISON OF PERFORMANCE AND CAREER PROGRESSION OF HIGH SCHOOL GRADUATES AND NON-GRADUATES IN THE AIR FORCE

I. INTRODUCTION

Prior to the implementation of the all-volunteer force, personnel planners were concerned whether sufficient numbers of young men and women, of the high quality needed to meet operational commitments, would be attracted to military service. Since the implementation of the all-volunteer force, the Air Force has had little, if any, difficulty in meeting the quotas necessary in fulfilling its manning requirements. It may be that because of the overall economic situation and current unemployment rates, a military career has become a more attractive occupational choice than in previous years. Due to this current favorable selection ratio, the Air Force has changed its procurement policy and implemented more restrictive enlistment standards. Beginning in January 1975, a prospective recruit has been required to meet the following prerequisites: a total of 170 on the four combined aptitude test composites of the Armed Services Vocational Aptitude Battery (ASVAB), a minimum of 45 on the General Aptitude Index, and, if classified in mental Categories III or IV on the Armed Forces Qualification Test (AFQT), completion of high school. In an economic recession, the numbers of prospective recruits meeting these more stringent enlistment qualifications may even exceed planned recruiting needs; however, if the selection ratio becomes less favorable in the future, enlistment standards may have to be modified again to maintain a viable force level. In changing enlistment standards for less favorable conditions, attention must be directed toward a policy decision which will broaden our manpower resource base; yet, while qualifying a larger number of applicants for possible military service, maximize the selection of potentially successful recruits and minimize the acceptance of those not likely to become productive servicemen.

One factor often considered important in recruitment policy has been graduation from high school. The percentage of high school graduates and non-graduates who have enlisted in the Air Force has varied from year to year. During the mid 1960's, the percentage of high school graduates was as high as 95 percent of the total accessions. However, with the implementation of Project 100,000 in the late 1960's, a greater percentage of the new mental standards personnel were high school non-graduates; although in the first year's accessions, over 67 percent of this low mental ability group had completed 12 years of education. Table 1 shows the percentage of non-prior service enlistees by educational levels for various time periods from 1956 through 1974.

Previous research has confirmed that high school graduation, or years of education completed, has been an important correlate of success in a military career. The relationship between educational level and aptitude scores has been delineated in a report by Vitola, Valentine, and Tupes (1967). They found a positive relationship between measured aptitude index and educational status with high school non-graduates achieving lower average aptitude scores than their counterparts with more education. The usefulness of educational data in classification and assignment has also received considerable attention (Brokaw, 1962, 1963; Lecznar, 1964). While the value of including educational data in classification and assignment was not universally recommended, some studies reported that high school graduation was significantly related to technical training success. A high positive relationship between educational level attained prior to service and service adjustment has been documented quite extensively (Flyer, 1959; Fisher, Ward, Holdrege, & Lawrence, 1960; Gordon & Bottenberg, 1962; Plag, 1962; Flyer, 1963; Gunderson, 1963; Plag, Arthur, & Goffman, 1970; Shoemaker, Drucker, & Kriner, 1974). Finally, research by Plag and Goffman (1966, 1967) has indicated a strong positive relationship between educational level and successful completion of the initial tour.

Results of studies such as these, coupled with the current, highly favorable selection ratio, have provided justification for the change in Air Force enlistment policy to limiting recruitment of high school non-graduates to only those in Categories I or II. However, a Navy project on administrative and disciplinary discharges reported a higher disciplinary loss rate among Category I high school non-graduates than among the non-graduates in the lower categories (Stephan, Carroll, & Brown, 1972). Such information emphasizes the need for a closer evaluation of both high school graduates and non-graduates so that policy decisions regarding future enlistments can be geared to recruit individuals who will most likely become

Table 1. Percentage of NPS Male Accessions by Educational Level for Various Time Periods

Educational Level	1956 Aug 1959 N = 289,726	Aug 1959 Dec 1961 N = 247,431	Jan 1962 Apr 1966 N = 380,072	May 1966 Dec 1968 N = 332,666	1969 N = 122,597	1970 N = 72,547	1971 N = 99,063	1972 N = 81,563	1973 N = 71,762	1974 N = 64,405*
High School Graduate (12 years or more)	63	73	86	95	94	91	83	87	89	89
High School Non-Graduate (11 years or less)	37	27	14	5	6	9	17	13	11	6

*Incomplete educational level data on 3,168 cases – 5% of 1974 population.

successful and productive airmen. In particular, it is believed that additional research, designed to delineate the advantages and disadvantages of recruiting individuals with lower educational qualifications, is required to prepare for the eventuality of less favorable selection ratios. Should changes in the economic climate of the civil sector occur and the number of prospective enlistees decrease, then information on the performance and career progression of individuals with lower educational qualifications would be invaluable for planning revised enlistment standards.

To provide a basis for evaluating the overall effectiveness of individuals with different educational backgrounds, which might be used in establishing selection procedures, this study investigates and compares the performance and career progression of high school graduates and non-graduates during their initial four-year tour in military service. In addition, attention is directed toward determining which of the non-graduates might be better risks than others.

II. METHOD

A total of 20,705 male non-prior service enlisted accessions, designated as Project 100,000 personnel, who enlisted during the period April 1967 through March 1968, comprised the sample population. The performance of these accessions was monitored throughout their initial four-year tour from 1967/1968 to 1971/1972. Subjects included all accessions classified by the AFQT as Category I and IV personnel and a 10 percent random sample of all Category II and III personnel who enlisted during the specific time period. All data regarding the progress, performance, and retention of these airmen was obtained from the historical record files maintained by the Computational Sciences Division of the Air Force Human Resources Laboratory. Analyses were not initiated until data on the final career decision of the sample population became available in 1972. Maturation of career data was dependent upon the completion of four years of service.

The sample population was divided by educational level for comparative analyses. Those individuals who completed 12 years or more of education prior to enlistment comprised the high school graduate group. Those accessions indicating they had completed only 11 years or less of education were designated as high school non-graduates.

Since ability level might be related to differential performance, the sample was further subdivided, by mental categories, as established by performance on the AFQT. Table 2 shows the number of individuals in each of the educational/mental category subgroups.

Table 2. **Sample Characteristics**

Mental Category	AFQT Percentile Range	High School Graduates	High School Non-Graduates
I	93–99	6,150	45
II	65–92	3,183	69
III	31–64	3,016	152
IV	21–30	7,770	320

Subgroups of interest were compared on various criterion measures of success in the Air Force. These measures were: graduation/elimination from basic military training, graduation/elimination from technical training, number of disciplinary actions, attainment of skill level, number of unsuitability discharges, and reenlistment decision.

For each of the comparisons, chi-square analyses were used to test for statistical significance of any differences, and where appropriate, an overall chi-square was partitioned into its one degree of freedom orthogonal components utilizing Castellian's method (Castellian, 1965). The Type I error rate was controlled at .001 per comparison.

III. RESULTS AND DISCUSSION

One of the first measures of success in military service is the successful completion of the six-week basic military training (BMT) program. The percentage of airmen, either successfully completing BMT or being eliminated from service during BMT, are presented, by educational status and mental category, in Table 3. Comparing the successful completion rates between high school graduates and non-graduates, it was found that a significantly ($X^2 = 116.70$, df = 1, $p < .001$) higher percentage of high school graduates (96.69%) successfully completed BMT than did the non-graduates (88.23%). Additionally, among the high school non-graduates, it was found that significantly ($X^2 = 11.90$, df = 1, $p < .001$) fewer non-graduate mental Category IV airmen (83.13%) completed BMT than did non-graduate mental Category III airmen (94.08%).

Table 3. **Performance in Basic Military Training**

Classification	% Passing	% Eliminated	Valid N
High School Graduates			
Total:	96.69	3.31	20,119
Category I:	98.24	1.76	6,150
Category II:	97.71	2.29	3,183
Cateogry III:	97.05	2.95	3,016
Cateogry IV:	95.23	4.77	7,770
High School Non-Graduates			
Total:	88.23	11.77	586
Category I:	97.78	2.22	45
Category II:	92.75	7.25	69
Category III:	94.08	5.92	152
Category IV:	83.13	16.87	320

After BMT, approximately 80 percent of Air Force accessions are assigned to some form of technical training. This represents a considerable cost in general, and, in particular, the funds expended on individuals who do not successfully graduate from their technical training programs is money wasted. Therefore, any differential performance associated with educational level becomes a matter of concern. The percentages of airmen successfully completing or being eliminated from technical training are presented in Table 4. Comparing the successful completion rates for technical training, it was found, again, that significantly ($X^2 = 14.49$, df = 1, $p < .001$) higher percentages of high school graduates (94.58%) completed technical training than did the non-graduates (89.54%). Among the non-graduates, there were no significant differences associated with mental category for technical training graduation.

Table 4. **Performance in Technical Training**

Classification	% Passing	% Eliminated	Valid N
High School Graduates			
Total:	94.58	5.42	14,384
Category I:	96.24	3.42	4,785
Category II:	95.92	4.08	2,404
Category III:	96.16	3.84	2,053
Category IV:	92.34	7.66	5,142
High School Non-Graduates			
Total:	89.54	10.46	325
Category I:	91.89	8.11	37
Category II:	90.91	9.09	55
Category III:	86.54	13.46	104
Category IV:	90.70	9.30	129

Another way to assess differential performance between groups in the military is by monitoring their progression through successively higher skill levels. The Air Force has a formalized series of skill levels which describe the working capability of an airman. These are comparable across differing jobs and each succeeding level encompasses both greater specific ability and general responsibility. For this study, the skill levels of interest were: Skill Level 1, unskilled; Skill Level 3, apprentice; Skill Level 5, journeyman; and Skill Level 7, supervisor. The first skill level comparison was made after the completion of the initial year of service and succeeding comparisons were made at one-year intervals, with the last comparison involving the skill level obtained or held at the completion of the airman's initial four years of service. The skill level comparisons were made on the following dichotomies: For the first year, Skill Level 1 versus all advanced skill levels; for the second and third years, Skill Level 1 and 3 versus 5 and 7; and for the fourth year, Skill Levels 1, 3, and 5 versus 7. These breakpoints were chosen because they appeared to represent, respectively, atypical lag, normal progression, and atypical advancement.

The percentages of high school graduate and non-graduate airmen still at the lower skill levels for each year are shown in Table 5. (Percentages by education status and mental categories at the various skill levels for each year are presented in Tables A1 through A4 in Appendix A.) For the first three comparisons, between graduates and non-graduates, significantly (X^2 = 11.15; 105.61; 58.17, df = 1, $p < .001$, respectively) larger percentages of high school non-graduates were still at the lower skill levels. There was no significant difference for the fourth comparison although the observed difference was in the same direction as in the previous comparisons. Among the high school non-graduates, only in the second year was any significant (X^2 = 10.57, df = 1, $p < .001$) difference found associated with mental categories (Tables A1 through A4). In this instance, a higher percentage of mental Category IV and III non-graduate airmen were still at lower skill levels than mental Category II non-graduate airmen. Aside from that specific case, no differences among high school non-graduate airmen were found.

Table 5. **Percentage at Lower Skill Levels by Year of Service**

Classification	Year 1 (Skill Level 1)	Year 2 (Skill Levels 1 or 3)	Year 3 (Skill Levels 1 or 3)	Year 4 (Skill Levels 1, 3, or 5)
High School Graduates	19.60	17.33	6.15	97.99
High School Non-Graduates	25.35	35.45	15.35	98.74

Note. — Lower skill level: For year 1, includes personnel not progressing beyond 1-level; for years 2 and 3, those not progressing beyond 1 or 3-level; for year 4, those not progressing beyond 1, 3 or 5-level.

Anytime an airman fails to complete his obligated tour, he represents a dollar and resource loss which might have been prevented. Disciplinary actions often lead to premature separation and are, in themselves, an additional burden in terms of money and time. Therefore, the percentages of high school graduate and non-graduate airmen completing their tour without being involved in any disciplinary action is a matter of concern. These percentages are shown in Table 6. It was found that a significantly (X^2 = 40.48, df = 1, $p < .001$) higher percentage of high school graduates completed their tour without any disciplinary action than did high school non-graduates. No differences were found among the non-graduate airmen.

Table 6. **Percentage of Sample Population Receiving Disciplinary Actions**

Classification	Number of Disciplinary Actions: None	1 or More	Valid N
High School Graduates			
Total:	95.70	4.30	20,119
Category I:	97.01	2.99	6,150
Category II:	97.02	2.98	3,183
Category III:	95.98	4.02	3,016
Category IV:	94.00	6.00	7,770
High School Non-Graduates			
Total:	90.10	9.90	586
Category I:	88.88	11.12	45
Category II:	91.30	8.40	69
Category III:	94.07	5.93	152
Category IV:	88.12	11.88	320

A direct indication of premature loss is an unsuitability discharge. The percentages of high school graduate and non-graduate airmen receiving a premature discharge because of unsuitability are shown in Table 7. A significantly ($X^2 = 211.55$, df = 1, $p < .001$) higher percentage of non-graduate airmen received unsuitability discharges than did high school graduates. Among the non-graduate airmen, no differences were found associated with mental categories.

Table 7. **Unsuitability Discharges**

Classification	% Receiving Unsuitability Discharge	% Retained for 4 Years of Initial Tour	Valid N
High School Graduates			
Total:	8.45	91.55	18,953
Category I:	4.87	95.13	5,789
Category II:	5.72	94.26	2,978
Category III:	7.96	92.04	2,752
Category IV:	12.71	87.29	7,074
High School Non-Graduates			
Total:	27.35	72.65	501
Category I:	20.93	79.07	43
Category II:	22.03	77.97	59
Category III:	21.88	78.12	128
Category IV:	32.10	67.90	271

A final indicator of success in a military career is a favorable career decision at the end of the initial tour. The percentages of high school graduate and non-graduate airmen, eligible to reenlist, who did reenlist were compared. These percentages are presented in Table 8. Again, a significant difference ($X^2 = 6.58$, df = 1, $p < .001$) was found between the high school graduate and non-graduate airmen. However, in this instance, a greater percentage of non-graduate airmen (29.86%) reenlisted, than did graduate airmen (23.92%). No differences were found among the mental category subgroups.

Table 8. **Reenlistment Status**

Classification	% Separated	% Reenlisted	Valid N
High School Graduates			
Total:	76.08	23.92	17,022
Category I:	75.83	24.17	5,507
Category II:	78.20	21.80	2,807
Category III:	78.72	21.28	2,533
Category IV:	74.25	25.75	6,175
High School Non-Graduates			
Total:	70.14	29.86	365
Category I:	64.71	35.29	34
Category II:	65.22	34.78	46
Category III:	67.33	24.67	101
Category IV:	73.91	26.09	184

IV. SUMMARY OF RESULTS

On all measures except the last, involving reenlistment decision, the high school graduate airmen performed significantly better than did their high school non-graduate counterparts. Higher percentages of high school graduates successfully completed basic military and technical training, advanced to higher skill levels quicker, encountered less disciplinary problems, and a smaller percentage received an unsuitability discharge. It seems consistently clear, from the data, that high school graduates become more productive enlisted personnel than do high school non-graduates.

Comparisons among the high school non-graduates, by mental category, revealed only two instances where ability, as measured by the AFQT, was related to differential performance. In these instances, it was found that mental Category IV non-graduate airmen were eliminated from basic military training at a higher rate than other non-graduate airmen and mental Category III and IV non-graduate airmen did not, at the end of their second year of service, advance as quickly to higher skill levels as did the other non-graduate airmen. Aside from these specific exceptions, no differences in performance related to mental category were found among the non-graduate airmen. However, current enlistment standards do make a distinction among those non-graduate airmen categorized as either Group I or II and those categorized as either Group III or IV. At present, only the non-graduate Group I and II applicants are eligible for enlistment. It would not seem that the data from this study would strongly support this particular cut-off point for high school non-graduate airmen since on the majority of measures, there were no differences between the performance of the different mental category subgroups of non-graduate airmen.

Impact of Current Enlistment Standards

Current Air Force enlistment standards would not permit the enlistment of 5,537 airmen included in the sample used in this study. To allow an appraisal of the overall effectiveness of the new Air Force recruiting policy, the percentages of correct identification of unsuccessful personnel (i.e., hit rate) and the percentages of incorrect labeling of successful personnel as potential failures (i.e., false positive rate) are presented for several criteria in Table 9. Also, for comparative purposes, similar percentages are shown as if screening were accomplished dependent only upon the completion of high school and from a combination of current enlistment standards plus an unequivocal high school completion requirement.

Table 9. **Impact of Differing Enlistment Standards**

Enlistment Standard	Percent Identified in Criterion Category			
	BMT	Technical Training	Disciplinary Actions	Unsuitability Discharge
Current Enlistment Standards				
% Failures correctly identified	40.90	38.37	41.12	39.25
% Successes incorrectly identified	26.24	23.36	26.20	24.90
High School Graduation Only				
% Failures correctly identified	9.39	4.18	6.52	8.02
% Successes incorrectly identified	2.59	2.09	2.66	2.09
Current Enlistment Standards plus High School Graduation				
% Failures correctly identified	41.51	39.40	41.12	40.54
% Successes incorrectly identified	26.73	24.05	26.42	25.13

Note. — Current enlistment standards: Four aptitude indexes (Mechanical, General, Administrative, and Electronics) must equal a total of 170 or higher; General Aptitude Index must equal 45 or higher; if individual is classified in AFQT Category III or IV, must be high school graduate.

The current enlistment standards generated an impressive hit rate of approximately 40 percent; however, this was also coupled with a false positive rate of approximately 25 percent. This would mean that for every three potentially unsuccessful candidates screened out from service, two potentially successful applicants would also have been excluded from enlisting. Only under conditions providing a very favorable selection ratio could a false positive rate this high be tolerated. In comparison, screening only on high school graduation provided the smallest hit and false positive rates while the addition of the unequivocal high school graduation requirement to the current enlistment standards produced a slight rise in hit rate and even smaller rise in false positive rate over the rate generated by the current enlistment standards alone.

V. CONCLUSION

The results of this study indicated significant and consistent differences in measures of military service performance between high school graduate and high school non-graduate airmen. The high school non-graduate airmen did not perform up to the standards of their high school graduate counterparts in either basic military training, technical training, or on-the-job performance as measured by attainment of advanced skill levels. Additionally, they accrued a higher percentage of disciplinary actions and unsuitability discharges. It would appear then, that the data from this study, as in previous work, reflect the importance of high school graduation for success in a military career.

However, it does not seem likely that this relationship, between high school graduation and military performance, can be totally explained by postulating a lower level of mental ability for the non-graduate airmen. Comparisons among the mental category sub-groups of non-graduate airmen revealed, with only two exceptions, no differences in performance related to differences in mental ability. Therefore, factors other than measured mental ability must account for some of the observed differences in performance. The data from this study do not allow the delineation of these other influences, but it is possible to speculate that motivational and social factors could play a large part in accounting for some of these differences in performance. Future research might be directed at identifying and quantifying these additional aspects as they relate to success in a military career.

The current enlistment standards, when applied a posteriori to this sample, generated impressively high hit rates, but also generated high false positive rates. If conditions in the civilian sector change and effectively alter the present selection ratio, it might be possible, or necessary, to again change the enlistment requirements. If the selection ratio becomes more favorable, a high school graduation requirement for all mental category groups might be considered. When this restriction was applied in conjunction with current enlistment standards, a small rise in hit rate was generated (coupled with an even smaller rise in false positive rate). This additional restriction alone would not make a dramatic impact, but considering the lack of differential performance found associated with mental categories among non-graduate airmen, it would appear that this would be a logical step. Additional research would be useful in specifying what further restrictions would function in the most appropriate manner. However, if conditions change so as to produce a less favorable selection ratio and the Air Force can no longer tolerate the high false positive rate generated by the current enlistment standards, then enlistment requirements will have to be lowered in order to fulfill manning needs. The results from this study do not lead to any clear decision concerning which high school non-graduates would be the most potentially successful subgroup of non-graduate applicants, but what few differences did surface appear to indicate that mental Category I, II, and III non-graduates would be a slightly better choice than mental Category IV non-graduates. Again, additional research is needed to delineate what other factors, besides mental ability, influence the course of a high school non-graduate's service career.

In summary, high school graduates constituted a more successful military group than did high school non-graduates, and among the non-graduates, in terms of mental ability subgroups, there were almost no differences in performance.

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APPENDIX A: SKILL LEVEL COMPARISONS

Table A1. **Skill Levels Year 1**

Classification	Level 1	Levels 3, 5, 7	Valid N
High School Graduates			
Total:	19.60	80.40	19,702
Category I:	25.32	74.68	5,927
Category II:	20.71	79.29	3,148
Category III:	14.76	85.24	2,986
Category IV:	16.59	83.41	7,641
High School Non-Graduates			
Total:	25.35	74.65	568
Category I:	29.54	70.46	44
Category II:	16.17	83.83	68
Cateogry III:	22.51	77.49	151
Category IV:	28.19	71.81	305

Table A2. **Skill Levels Year 2**

Classification	Levels 1 and 3	Levels 5 and 7	Valid N
High School Graduates			
Total:	17.33	82.67	18,882
Category I:	14.20	85.80	5,779
Category II:	15.31	84.69	3,056
Category III:	15.70	84.30	2,865
Category IV:	21.34	78.66	7,182
High School Non-Graduates			
Total:	35.45	64.55	488
Category I:	30.23	69.77	43
Category II:	19.67	80.33	61
Category III:	34.07	65.93	135
Category IV:	40.96	59.04	249

Table A3. **Skill Levels Year 3**

Classification	Levels 1 and 3	Levels 5 and 7	Valid N
High School Graduates			
Total:	6.15	93.85	18,264
Category I:	5.46	94.54	5,676
Category II:	4.51	95.49	2,987
Category III:	5.94	94.06	2,759
Category IV:	7.51	92.49	6,842
High School Non-Graduates			
Total:	15.35	84.65	430
Category I:	10.25	89.75	39
Category II:	9.09	90.91	55
Category III:	12.71	87.29	118
Category IV:	19.26	80.74	218

Table A4. **Skill Levels Year 4**

Classification	Levels 1, 3, and 5	Level 7	Valid N
High School Graduates			
Total:	97.99	2.01	17,693
Category I:	96.52	3.48	5,550
Category II:	97.69	2.31	2,905
Category III:	98.45	1.55	2,660
Category IV:	99.16	.84	6,578
High School Non-Graduates			
Total:	98.74	1.26	396
Category I:	94.87	5.13	39
Category II:	96.15	3.85	52
Category III:	100.00	.00	110
Cateogry IV:	99.48	.52	195

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